

### REMARKS

These remarks are in response to the Office Action mailed September 21, 2001. Claim 1-49, 73-84, and 91-97 have been canceled without prejudice to Applicants' right to prosecute the canceled subject matter in any divisional, continuation, continuation-in-part, or other application. Claims 98-158 have been added. Support for the amendments can be found throughout the specification and claims as originally filed. Support for "electrically coupled between two conductive leads," can be found, for example, at page 25, lines 1-3. Support for "alternating regions," can be found, for example, at page 25, line 12. Support for "interpenetrating," can be found, for example, at page 53, line 13. Support for claim 148, can be found, for example, at page 22, lines 3-5, page 23, lines 13-16, and Table 1 (page 24). Support for "wherein the inorganic conductor has an electrical conductivity that decreases as the temperature increases" can be found, for example, at page 34, lines 9-14. In addition, the new claims correct grammatical and typographical errors present in the canceled claims, such changes do not narrow the scope of the claims and are not made for purposes of patentability. No new matter is believed to have been added.

Attached hereto is Appendix A containing a new Figure 1 for entry into the present application. Appendix B shows changes to Figure 1 using standard notation (underlining and bracketing). No new matter has been added. Applicants respectfully request reconsideration and allowance of the pending claims.

#### I. OBJECTION TO THE DRAWINGS

The drawings are objected to under 37 C.F.R. §1.83(a), as allegedly failing to show every feature of the invention specified in the claims. Attached hereto as Appendix A and B is a substitute Figure 1 and a marked up copy showing the changes made using standard notation (underlining and bracketing), respectively.

Applicants submit that 37 C.F.R. §1.83(a) states that "conventional features disclosed in the description and claims, where there detailed illustration is *not essential*

for a proper understanding of the invention, *should* be illustrated. . . .” (emphasis added). Applicants submit that the features of the claims are clearly understood by one of skill in the art with reference to the description, figures (*e.g.*, figure 1A, 1B, and 2) and as such need not be set forth in the drawings. However, in order to advance prosecution Applicants have removed reference to “a wand” from the claims.

## **II. REJECTION UNDER 35 U.S.C. §112, FIRST PARAGRAPH**

Claims 73-76, and 83 stand rejected under 35 U.S.C. §112, first paragraph as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected to make and/or use the invention. The Office Action alleges that the complexity of detecting a microorganism has not been demonstrated in any manner in the instant specification. This rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

New claim 148 (corresponding to canceled claim 73) recites “a biomarker of a microorganism . . . whereby the computer associates the response profile indicative of the biomarker with a microorganism. . . .” Applicants respectfully direct the Examiner to, for example, page 22, lines 3-5, page 23, lines 13-16, and Table 1 (page 24). The foregoing exemplary pages and Table 1 demonstrate that biomarkers are known which are indicative of various microorganisms (*e.g.*, Table 1 shows amines are associated with bacterial vaginosis. Accordingly, the description demonstrates that the sensors provide a response to, for example, biogenic amines (see Figure 4) and that such amines have been linked not only to microorganisms but also to diseases.

The Office Action rejected claim 83 as allegedly not enabled for the detection of microorganisms, however Applicants believe this rejection is in error as claim 83 did not recite detecting microorganisms.

In view of the foregoing amendments and remarks, Applicants respectfully request withdrawal of the §112, first paragraph rejection.

### **III. REJECTION UNDER 35 U.S.C. §112, SECOND PARAGRAPH**

Claims 1-49, 73-84, and 91-97 stand rejected under 35 U.S.C. §112, second paragraph as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

The Office Action alleges that each of the independent claims are unclear as to “what the scope of or structural relationship between the ‘regions of a conductive organic material and a conductive material compositionally different than the conductive organic material’ encompasses.” (Office Action at page 3, paragraph 5). Applicants’ new claims more clearly set for the structural relationship of the elements of the invention. Applicants’ new claims recite, for example, that the regions are “alternating” or “alternating interpenetrating”. Applicants believe this overcomes the rejection.

The Office Action also alleges that in claims 8, 13, 30, and 35 “it is not clear which response, first or second, is intended.” (Office Action at page 3, paragraph 5). Applicants new claims 111, 115, 134, and 137 (corresponding to canceled claims 8, 13, 30, and 35) recite “first and/or second response”. Applicants believe that this overcomes the rejection.

The Office Action further alleges that the term “conductive material” in claims 10, 20-21, 32, and 42-43 does not have proper antecedent basis. Applicants submit that the new claims recite proper antecedent basis. Applicants believe that this overcomes the rejection.

The Office Action alleges that claims 12 and 34 fail to provide proper antecedent basis for “the resistance”. Applicants have canceled claims 12 and 34 thus rendering the rejection moot. As the Examiner stated at page 3 of the Office Action, the language of claims 12 and 34 does not limit the parent claim, accordingly the cancellation of claim 12 and 34 does not narrow the scope of the present invention. Applicants believe that this overcomes the rejection.

The Office Action alleges that claims 14 and 35 fail to provide proper antecedent basis for "the electrical impedance". Applicants have canceled claim 14 thus rendering the rejection moot with respect to this claim. Although the Examiner indicates claim 35 in the present rejection, Applicants believe that the Examiner was referring to claim 36. Applicants have canceled claim 36. As the Examiner stated at page 3 of the Office Action, the language of claim 14 does not limit the parent claim, accordingly the cancellation of claim 14 does not narrow the scope of the present invention. Similarly, the cancellation of claim 36 does not narrow the scope of the present invention. Applicants believe that this overcomes the rejection.

The Office Action alleges that claims 16 and 38 "suffer the same problem" as claims 12, 14, 34, and 35. Applicants have canceled claim 16 and 38 thus rendering the rejection moot. The cancellation of the subject matter of claim 16 and 38 does not narrow the scope of the present invention. Applicants believe that this overcomes the rejection.

The Office Action alleges that claims 24-25 and 47-48 fail to further limit the invention. Claims 24-25 and 47-48 have been canceled, thus rendering the rejection moot.

Claim 82 stand rejected as allegedly unclear regarding the term "optimized". Applicants' new claims do not recite the term "optimized". Accordingly, the rejection may be withdrawn.

The Office Action alleges that claim 83 fails to further limit the invention. Claim 83 has been canceled, thus rendering the rejection moot.

The Office Action alleges that it is unclear if the sensors of claims 77 or 84 "further comprises" a sensor of the type listed or if the claim is trying to redefine the material. Applicants believe that new claims 152 and 158 clearly set forth that claim 158 does not attempt to redefine the material, but rather sets forth that the plurality of sensors of claim 152 can, for example, comprise one sensor having the conductive organic material and a compositionally different conductive material and at least one other sensor in the plurality of sensor can be selected from the group recited in claim 158. Applicants believe that these amendments overcome the rejection.

Based upon the foregoing remarks Applicants respectfully request withdrawal of the §112, second paragraph rejections.

#### **IV. REJECTION UNDER 35 U.S.C. §102**

Claims 1, 3-17, 20-21, 24-39, 42-43, 45-49, 73-83, and 91-93 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by Lewis (USP 5,571,401; "the '401 patent") or Freund (Proc. Natl. Acad. Sci. USA, 1995). The rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

The '401 patent and the Freund paper do not teach or suggest each and every element of Applicants' claimed invention. As the Office Action points out at page 8, paragraph 15, "Lewis [*i.e.*, the '401 patent] does not teach compositions in which the two conductive materials are mixed together to form a single sensing material having the compositionally different conductive material within the conductive organic material." The Office Action also states that the Freund paper "has an equivalent sensor array teaching" as the '401 patent (Office Action at page 4, paragraph 7).

The pending new claims recite that the conductive organic material and the compositionally different conductive material are disposed between at least two conductive leads. The '401 patent and Freund paper fail to teach or suggest a sensor that comprises, in addition to and between the conductive leads, a sensing area having alternating regions of a conductive organic material and a conductive material compositionally different than the conductive organic material. Accordingly, the '401 patent and the Freund paper do not teach or suggest each and every element of Applicants' claimed invention and thus cannot anticipate Applicants invention. Accordingly, Applicants respectfully request withdrawal of the §102(b) rejection.

Claims 1, 3, and 91-92 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by Miller (USP 5,417,100). This rejection is moot with respect to the

canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

The Office Action alleges that Miller anticipates Applicants' invention because Miller teaches "a combination of regions of a conductive organic material . . . and regions of a compositionally different conductive material (*the electrodes*)." (Office Action at page 4, paragraph 8; emphasis added). As with the '401 patent and the Freund paper, Miller fails to teach or suggest a sensor that comprises, in addition to and between the conductive leads (*i.e.*, electrodes), a sensing area having alternating regions of a conductive organic material and a conductive material compositionally different than the conductive organic material. Accordingly, Miller does not teach or suggest each and every element of Applicants' claimed invention and thus cannot anticipate Applicants' invention. Accordingly, Applicants respectfully request withdrawal of the §102(b) rejection.

Claims 1, 4-10, 13-14, 17, 20-21, 24-32, 35-36, 39, 42-43, 45-49, 73-83, and 91-93 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by Pearce (Analyst 1993). This rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

The Office Action alleges that Pearce teaches "compositions of the polymer sensors which each are a combination of regions of a conductive organic material and regions of a compositionally different conductive material (*the electrodes*)." (Office Action at page 5, paragraph 9; emphasis added). As with the '401 patent, Freund, and Miller, Pearce fails to teach or suggest a sensor that comprises, in addition to and between the conductive leads (*i.e.*, electrodes), a sensing area having alternating regions of a conductive organic material and a conductive material compositionally different than the conductive organic material. Accordingly, Pearce does not teach or suggest each and every element of Applicants' claimed invention and thus cannot anticipate Applicants' invention. Accordingly, Applicants respectfully request withdrawal of the §102(b) rejection.

Claims 1, 4-10, 13-14, 17, 20-21, 24-32, 35-36, 39, 42-43, 45-49, 73-83, and 91-93 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by Slater (Analyst 1993). This rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

The Office Action alleges that Slater teaches "compositions of the polymer sensors which each are a combination of regions of a conductive organic material and regions of a compositionally different conductive material (*the electrodes*)." (Office Action at page 5, paragraph 9; emphasis added). As with the '401 patent, Freund, Miller, and Pearce, Slater fails to teach or suggest a sensor that comprises, in addition to and between the conductive leads (*i.e.*, electrodes), a sensing area having alternating regions of a conductive organic material and a conductive material compositionally different than the conductive organic material. Accordingly, Slater does not teach or suggest each and every element of Applicants' claimed invention and thus cannot anticipate Applicants' invention. Accordingly, Applicants respectfully request withdrawal of the §102(b) rejection.

Claim 1 stands rejected under 35 U.S.C. §102(b) as allegedly anticipated by de Lacy Costello (J. Mater. Chem. 1996). This rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

New claims 98, 104, and 105 recite that the "inorganic conductor has an electrical conductivity that decreases as the temperature increases." One of skill in the art will recognize that tin oxide does not have this physical characteristic. As the tin dioxide composite sensors in de Lacy Costello has an electrical conductivity that increases as the temperature increases (a characteristic of tin-oxide), the sensors of de Lacy Costello cannot anticipate Applicants' claimed invention. Thus, de Lacy Costello does not teach or suggest each and every element of Applicants' claimed invention. Accordingly, Applicants respectfully request withdrawal of the §102(b) rejection.

Claims 1-3 stand rejected under 35 U.S.C. the §102(b) as allegedly anticipated by Kashiwazaki (JP 63-308807). This rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

Kashiwazaki teaches a multilayer film having a film base "consisting of a polymer matrix and carbon black and/or graphite powder" and a conductive polymer layer "on the surface of the base polymer film" (i.e., the carbon black and/or graphite powder) (See Abstract of Kashiwazaki). Kashiwazaki does not teach or suggest a sensor that is responsive to an analyte, nor an apparatus for detecting a change in a sensing area when contacted with an analyte (see, *e.g.*, Applicants' claims 98, 104, and 105). In addition, Kashiwazaki does not teach or suggest "*interpenetrating* regions of a conductive organic material and a conductive material compositionally different than the conductive organic material. . . ." (see, *e.g.*, Applicants' claims 124, 126, and 127). Accordingly, Applicants respectfully request withdrawal of the §102(b) rejection.

Claims 1-3, 91-92, and 94-95 stand rejected under 35 U.S.C. the §102(b) as allegedly anticipated by Ikezaki (JP 62-257968) or Tamura (JP 63-120733). This rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

As with Kashiwazaki, above, Ikezaki does not teach or suggest a sensor that provides a first response to a first analyte and a second response to a second different analyte, nor does Ikezaki teach or suggest an apparatus for detecting a change in a sensing area. Accordingly, Ikezaki cannot anticipate Applicants' claimed invention.

Tamura allegedly describes an electroconductive organic polymer containing an electron acceptor as a dopant and consisting essentially of a linear polymer having as a main repeating unit a quinonediimine structure. No particular utility for the electroconductive polymers of Tamura is disclosed. Tamura does not teach or suggest a sensor, a change in conductivity of the composition when contacted with an analyte, nor does Tamura teach or suggest a measuring apparatus for detecting a change when contacted with an analyte. Thus, Tamura does not teach or suggest Applicants'



invention. Accordingly, Applicants respectfully request withdrawal of the §102(b) rejections over Ikezaki and Tamura.

**V. REJECTION UNDER 35 U.S.C. §103(a)**

Claims 1-49, 73-84, and 91-97 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Lewis (the '401 patent) as applied above under §102(b), and further in view of de Lacy Costello or Rajeshwar. The Office Action states that Lewis (the '401 patent) "does not teach compositions in which the two conductive materials are mixed together to form a single sensing material having the compositionally different conductive material within the conductive organic material." (Office Action at page 8, last three lines). The Office Action states that de Lacy Costello teaches composites of organic-inorganic semiconductor sensors of tin dioxide and polypyrrole. The Office Action alleges that Rajeshwar presents polypyrrole composites containing platinum or carbon black and discuss the synthesis and applications of the material. The Office Action alleges that it would have been obvious to one of skill in the art at the time the present invention was made to incorporate the teachings of de Lacy Costello or Rajeshwar relative to the incorporation of conductors such as carbon black, platinum and tin dioxide into the conductive organic polymers used in the sensor arrays of Lewis (the '401 patent) because of the enhanced properties as taught by both de Lacy Costello or Rajeshwar. This rejection is moot with respect to the canceled claims. Applicants respectfully traverse this rejection with respect to the new claims.

In summary, the combination of the '401 patent and de Lacy Costello, or the '401 patent and Rajeshwar does not render Applicants' claimed invention obvious. None of these references, either alone or in combination, teach or suggest "alternating regions of conductive organic material and a conductive material compositionally different than the conductive organic material" between two conductive leads (*e.g.*, within a sensing area) as recited in Applicants' claimed invention (see, *e.g.*, claim 98). A *prima facie* case of obviousness has not been set forth in the Office Action. To establish a *prima facie* case of obviousness, three basic criteria must be met. MPEP §2143. First, there must be some

suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); MPEP §2143.

The '401 patent in view of de Lacy Costello fails to teach each and every element of Applicants' claimed invention. The '401 patent fails to teach or suggest "alternating conductive organic material and a conductive material compositionally different than the conductive organic material disposed between. . . the conductive leads" Rather the '401 patent teaches composites of a conductive material and an insulating material between two conductive leads. Thus, the primary reference, the '401 patent, fails to teach each and every element of Applicants' claimed invention.

In order to overcome the deficiencies of the '401 patent, the Office Action combines the '401 patent with de Lacy Costello for the teaching of a composite organic-inorganic semiconductor sensor. Applicants respectfully submit that there is no teaching to combine Lewis (the '401 patent) with de Lacy Costello since they teach two different conductive materials, however, even if there was a suggestion to combine the two references the combination still does not teach or suggest each and every element of Applicants' claimed invention. For example, de Lacy Costello teaches an inorganic semiconductive material composite (*i.e.*, a material that has an electrical conductivity that increases as the temperature increases). Applicants' claimed invention (see, *e.g.*, claim 98) recites an inorganic conductive material wherein the conductivity of the material decreases as the temperature increases. Accordingly, a combination of Lewis (the '401 patent) and de Lacy Costello fails to teach or suggest, "alternating regions of conductive organic material and a conductive material compositionally different than the conductive

organic material" between two leads where an inorganic conductor has a "conductivity that decreases as the temperature increases."

In order to further overcome the deficiencies of the '401 patent, the Office Action combines the '401 patent in view of Rajeshwar. Rajeshwar also fails to teach or suggest each and every element. Although Rajeshwar mentions the use of matrix composites as detecting analytes such detection is not done by detecting a change in conductivity or resistance in the material but rather by utilizing an additional compound that accepts released anions such as the fluorophoric probes pyrene or naphthalene sulfonate (see, Rajeshwar at page 235, first column, second full paragraph). Accordingly the combination of the '401 patent and Rajeshwar fail to teach or suggest each and every element of Applicants' claimed invention.

Finally, the Applicants respectfully remind the Examiner that it is impermissible to ignore the advantages, properties, utilities and unexpected results that flow from the claimed invention; they are part of the invention as a whole. *In re Wright*, 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988); *In re Sernaker*, 702 F.2d 989, 217 USPQ 1 (Fed. Cir. 1983). Unexpected properties must always be considered when determining obviousness. The Applicants respectfully direct the Examiner to, for example, Figure 4 and page 15, lines 12-18, which recite and demonstrate that the "response is orders of magnitude larger than any seen from sensors prepared from insulating polymer-carbon black composite films." The Examiner is also directed to page 82, lines 20-23, which states, "Sensors prepared from emeraldine . . . consistently exhibit a response to amines which is several orders of magnitude larger than any observed from conventional polymer-carbon black sensors." As stated in *Application of Orfeo*, 440 F.2d 439, 442 (CCPA 1971),

We think that this is one of those cases where even though the claimed invention involves the use of a known compound in a known process it is still unobvious to one of ordinary skill in the art because of the new and unexpected results and effects achieved.

In re Application of:

Lewis et al.

Application No.: 09/409,644

Filed: October 1, 1999

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PATENT

Attorney Docket No.: CIT1250-2

Accordingly, Applicants respectfully request withdrawal of the §103(a) rejection based upon the combination of Lewis (the '401 patent) in view of de Lacy Costello, or Lewis (the '401 patent) in view of Rajeshwar.

The Examiner is invited to call the undersigned attorney at (858) 677-1456 to discuss any remaining issues and to clarify any questions or concerns the Examiner may have after reviewing this Response.

No fees in addition to those identified in the transmittal filed herewith are believed to be due for filing of the present response. Should any additional fee be required or any credit be due the Examiner is authorized to charge any fees or credit any overpayments, to deposit account number 50-1355.

Respectfully submitted,

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# ELEMENT, CONDUCTING ORGANIC MATERIAL, CONDUCTING MATERIAL

1. polyaniline, carbon black
2. polyaniline, Ag
3. polyaniline, Au
4. polyaniline, Pt
5. polyaniline ES, carbon black
6. polyaniline ES, Ag
7. polyaniline ES, Au
8. polyaniline ES, Pt
9. polypyrrole, carbon black
10. polypyrrole, Au
11. polypyrrole, Ag
12. polythiophene, carbon black
13. polythiophene, Cu
14. polyEDOT, carbon black
15. polyEDOT, Pt
16. polyEDOT, Ag

CONDUCTING ORGANIC  
MATERIAL, CONDUCTING  
MATERIAL

INTERDIGITATED  
ELECTRODE  
ARRAY

FIG. 1A-1

FIG. 1A-1

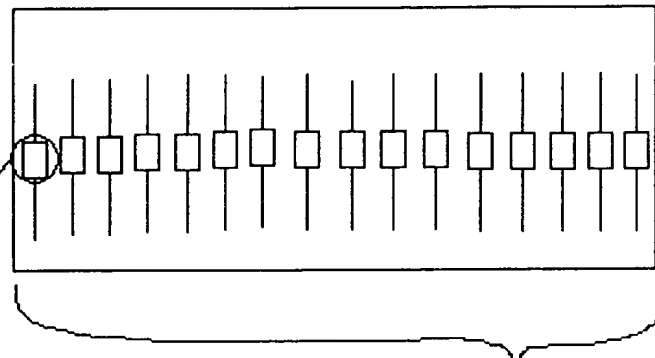


FIG. 1A

INDIVIDUAL  
SENSOR  
RESPONSES

SENSOR ARRAY  
RESPONSE

IDENTIFICATION  
VIA PATTERN  
RECOGNITION

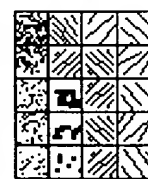
SUBSTRATE A

SUBSTRATE B

SUBSTRATE C

EXPOSE  
UNKNOWN TO  
SENSOR ARRAY

SENSOR ARRAY



RESISTANCE

RESISTANCE

RESISTANCE

TIME

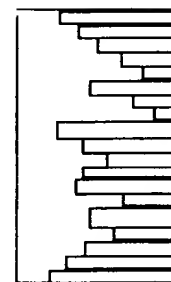
TIME

TIME

TIME

TIME

TIME



SENSOR

FIG. 1B

Disapproved  
5/18/02  
28